


W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
09.02.23	4	Tube bent high on one side.	<p>CP</p> <p>09.02.23</p> <p>PC</p> <p>08/04/23</p>	<p>Trim HIGH SIDE TO</p> <p>MATCH OTHER SIDE (30.18")</p> <p>Acceptable</p>	 <p>9-2-23</p>	<p>S</p> <p>09/02/23</p>	<p>CP</p> <p>09.02.23</p> <p>PC</p> <p>08/04/23</p>	<p>S</p> <p>09/02/23</p>

NOTE: Date & initial all entries

Date: Tuesday, 17/02/2009 9:00:23 AM
 User: Julie Dawson

Process Sheet

Customer	: CU-DAR001 Dart Helicopters Services	Drawing Name	: HIGH AFT X-TUBE 412
Job Number	: 45806		
Estimate Number	: 10559		
P.O. Number	:	Part Number	: D412664203
This Issue	: 17/02/2009 S.O. No. :	Drawing Number	: D412-664-243 REV D
Prsht Rev.	: NC	Project Number	: N/A
First Issue	: / / Type : CROSSTUBES	Drawing Revision	: D
Previous Run	: 45805	Material	:
Written By	:	Due Date	: 10/03/2009 Qty: 1 Um: Each
Checked & Approved By	: <u>JUD 09.02.07</u>		
Comment	: Est Rev:E 04.02.16 Reformat; Added D3189-1 K/DS Est Rev:F 06-03-29 Remove Coments on Pick List JLM Est Rev:G 06.12.08 per ECN 886 EC Est Rev:H 07-04-30 As per Rev D JLM Est Rev:I 08-06-12 add comment in seq. 21 DD verified by:EC		

Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
----------------	------------------------------	----------------------

1.0	DC	DOCUMENT CONTROL
-----	----	------------------

**Comment:** DOCUMENT CONTROL

Photocopy bluefile and create labels as per PPP D412-664-203 CHG 006

5/09/05

2.0	PACKAGING 1	PACKAGING RESOURCE #1
-----	-------------	-----------------------

**Comment:** PACKAGING RESOURCE #1

3.0	D412664203TRN	Crosstube Turning Detail
-----	---------------	--------------------------

**Comment:** Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

CROSSTUBE TURNING DETAIL

batch *B-44070*

MB 09.02.18 ⑦

4.0	BENDING	BENDING MACHINE - SKIDTUBES
-----	---------	-----------------------------

**Comment:** BENDING MACHINE

Bend tube as per Dwg D412-664-243 using CNC bender program 412-af and Folio FT010

DP 9-2-16

5.0	QC15	DIMENSIONAL CHECK OF X-TUBES
-----	------	------------------------------

**Comment:** DIMENSIONAL CHECK OF X-TUBES

UP 09.02.23

W/O:		WORK ORDER CHANGES					
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Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 45806

Part Number: D412664203

Job Number:



Seq. #:

Machine Or Operation:

Description:

6.0

CROSSTUBES

CROSSTUBES RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill pilot-holes in tube as per Dwg D412-664-243 using drill Jig DT8550 & DT8551

2-Ream hole to finish size in tube as per Dwg D412-664-243 using drill Jig DT8550 & DT8551. Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes.

3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-243

DP
9-2-23

AWM 9-2-23

7.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

AWM 9-2-23

8.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

S 09/02/24 HC

9.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

S 09/02/24 HC

checked
note 9/2/23

10.0

OUTSIDE SERV.11

OUTSIDE SERVICE -CROSSTUBES



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038Or

Issue P/O: 8259 LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

C 209/02/24 D

11.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order.

P 19/2/24 D

W/O:		WORK ORDER CHANGES					
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NOTE: Date & initial all entries

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User: Julie Dawson

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 45806

Part Number: D412664203

Job Number:



Seq. #:	Machine Or Operation:	Description :
---------	-----------------------	---------------

12.0

QC5

INSPECT WORK TO CURRENT STEP



29.02.25 ①



Comment: Inspect for damage & ensure results are as per Dwg D412-664-203

13.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per QSI 005 4.2

PRIME:

Start Time: 9:00

Finish Time: 10:30

RT 07-02-25

PAINT:

Start Time: 12:30

Finish Time: 2:00

14.0

QC14

INSPECT SPRAY PAINT



09.02.26 ①



Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

15.0

D3595063570

RUBBER CUSHION



Comment: Qty.: 4.0000 Each(s)/Unit Total: 4.0000 Each(s)

Rubber Cushion

Batch: 42243

RT 09-02-26

16.0

D2856600

Abrasion Strip



Comment: Qty.: 1.7640 f(s)/Unit Total: 1.7640 f(s)

Pick:

Qty Part number Description Batch

2 D2856-600(Cut to 10.090") Abrasion Strip

36396

RT 09-02-26

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Tuesday, 17/02/2009 9:00:23 AM
User: Julie Dawson

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 45806

Part Number: D412664203

Job Number:



Seq. #:	Machine Or Operation:	Description :
---------	-----------------------	---------------

17.0	D28961	Support
------	--------	---------



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)
Pick:

Qty Part number Description Batch

1 D2896-1

Support 355 77

25 09-02-24

18.0	D31891	Chafing Shield
------	--------	----------------



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)
Pick:

Qty Part number Description Batch

2 D3189-1

Chafing Shield 41659

25 09-02-24

19.0	MS2192028	Clamp(per MIL-DTL-8783C)
------	-----------	--------------------------



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)
Pick:

Qty Part number Description Batch

4 MS21920-28

Clamp 109181 ^{v2} / 109182

25 09-02-24

20.0	MS2192030	clamp(per MIL-DTL-8783C)
------	-----------	--------------------------



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)
clamp(per MIL-DTL-8783C)
batch: 107545

25 09-02-24

21.0	CROSSTUBES	CROSSTUBES RESOURCE 1
------	------------	-----------------------



Comment: LANDING GEAR RESOURCE 1

Assemble as per Dwg D412-664-203

1- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe

2-Install supports with magnobond as per QSI 015 Adhere for for 12 Hrs

A/R 6398 Magnobond

Batch: 109 900

Expiry Date: 09-09-19

25 09-02-24

3-Install clamps as per Dwg D212-664-203 using installaiton jig DT9024 with 0.010 thick brass shims on both chafing sheild (D3189-1). Torque clamps to 80-100 in lb.

25 09-03-04

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
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Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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NOTE: Date & initial all entries

Date: Tuesday, 17/02/2009 9:00:23 AM
User: Julie Dawson

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 45806

Part Number: D412664203

Job Number:



Seq. #:	Machine Or Operation:	Description :
---------	-----------------------	---------------

22.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

S 02/03/04 (41)

23.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Pick Packing Kit

24.0

AN640A

Bolt



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

Bolt

Batch: M110267

SS 09/03/04 (X)

25.0

AN641A

Bolt



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Bolt

Batch: 109371

SS 09/03/04 (X)

26.0

AN960JD616

Washer



Comment: Qty.: 18.0000 Each(s)/Unit Total : 18.0000 Each(s)

Washer

Batch: M110002

SS 09/03/04 (X)

27.0

MS21042L6

Nut



Comment: Qty.: 6.0000 Each(s)/Unit Total : 6.0000 Each(s)

Nut

Batch: 108183

SS 09/03/04 (X)

28.0

QC4

INSPECT 100% KITS FOR COMPLETENESS



Comment: INSPECT 100% KITS FOR COMPLETENESS

S 02/03/05 (A)

29.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D412-664-203

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
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User: Julie Dawson

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: HIGH AFT X-TUBE 412

Job Number: 45806

Part Number: D412664203

Job Number:



Seq. #:

Machine Or Operation:

Description :

*****Ensure tube is not packaged if curing time is less than 12 hrs, see step 27 for application time & date

Time & date of packaging: 10:00AM @ 09/03/05 S 2/7/15

Location:

PPP Rev:

H

9/3/5

SP

30.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

HP 09/03/06

Job Completion



MF
09-03-05

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
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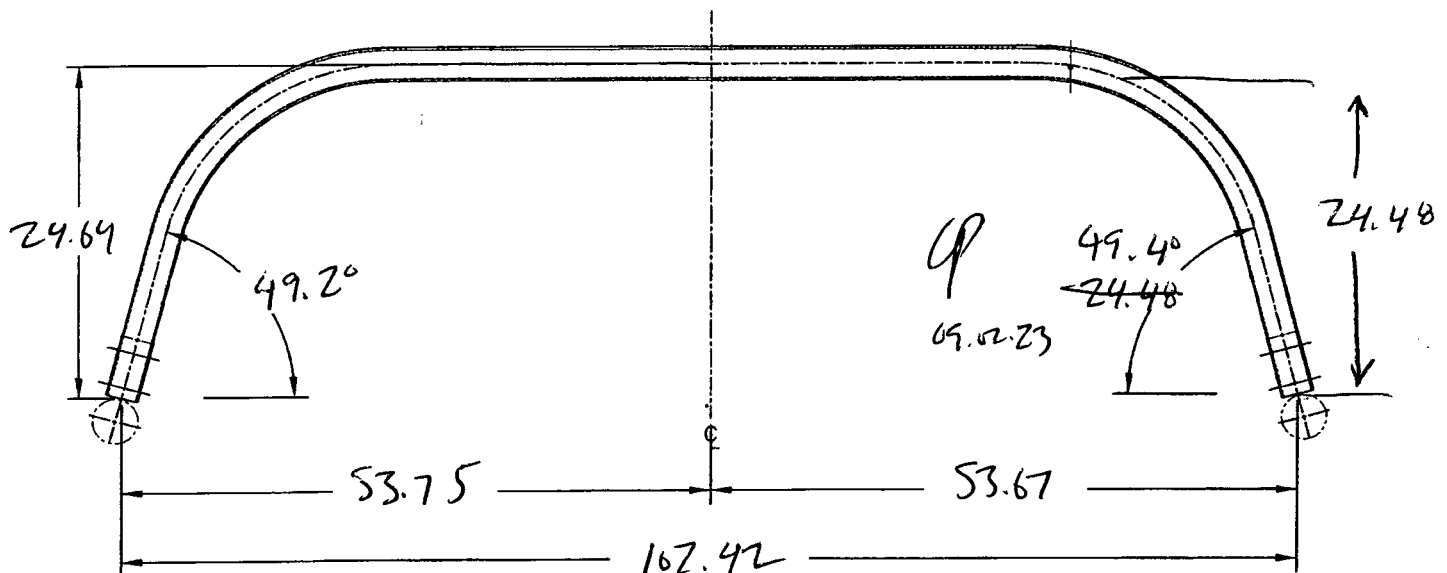
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NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order: 488060
Description: Crosstube High Aft (412)	Part Number: D412-664-203
Inspection Dwg: D412-664-243 Rev: D	Page 1 of 1

Required Dimension	Min	Max
Height	24.24	24.50
1/2 Span	53.59	53.85
Angle	49	52
Total Span	107.18	107.70



Comments
Tube is high on one side. TRIM TO HEIGHT OF OTHER SIDE.

QC15 Inspection	P 09.02.23
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	07.05.08	Dimensions updated per Dwg rev. D	KJ/JLM	

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
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NOTE: Date & initial all entries

DART

DESIGN PH	DRAWN BY PH	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED Q	APPROVED [Signature]	DRAWING NO. D412-664-243	REV. D SHEET 1 OF 3
DATE 07.03.09		TITLE CROSSTUBE ASSEMBLY (412 HI AFT) NTS	
A	01.10.17	NEW ISSUE	
B	05.02.04	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	
C	06.10.27	REMOVE D2856-600-1087, ADD D2732-058 & MAGNOBOND 6398 MS21920-32 WAS MS21920-30	
D	07.03.09	REMOVE D2732-058, CHANGE TO D3595-063-570	

RELEASE07.04.24 **[Signature]**

Qty	Part Number	Description
X	D412-664-243	CROSSTUBE ASSEMBLY (412 HIGH AFT)
1	D6009-129	CROSSTUBE
2	D3595-063-570	RUBBER CUSHION
1	D2896-1	SUPPORT
2	D2856-600-1009	ABRASION STRIP
4	MS21920-28	CLAMP
2	MS21920-30	CLAMP (OR MS21920-32)
2	D3189-1	CHAFING SHIELD
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

GENERAL NOTES:

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6009-129
FINISHED LENGTH = 124.09±0.020
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-600-1009 ABRASION STRIP WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2896-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-30 CLAMPS (OR -32) WITH D3595-063-570 RUBBER CUSHIONS TO SECURE D2896-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

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WORK ORDER

412809

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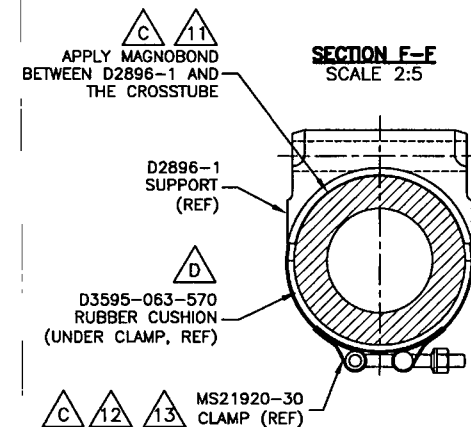
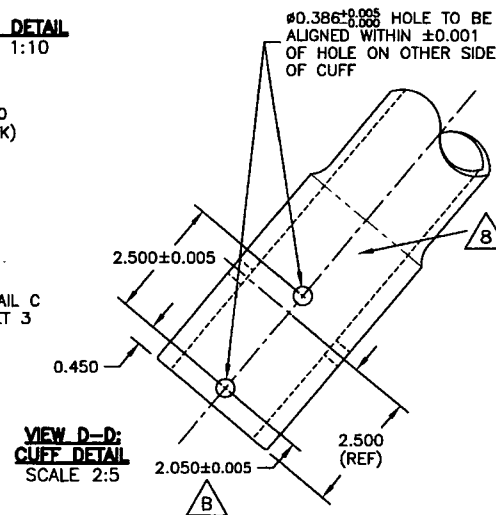
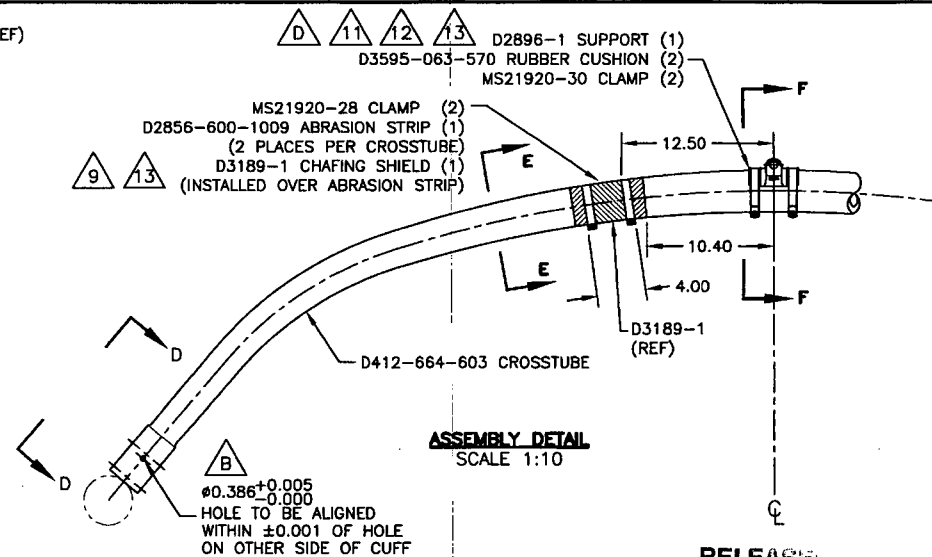
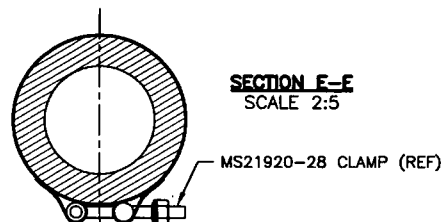
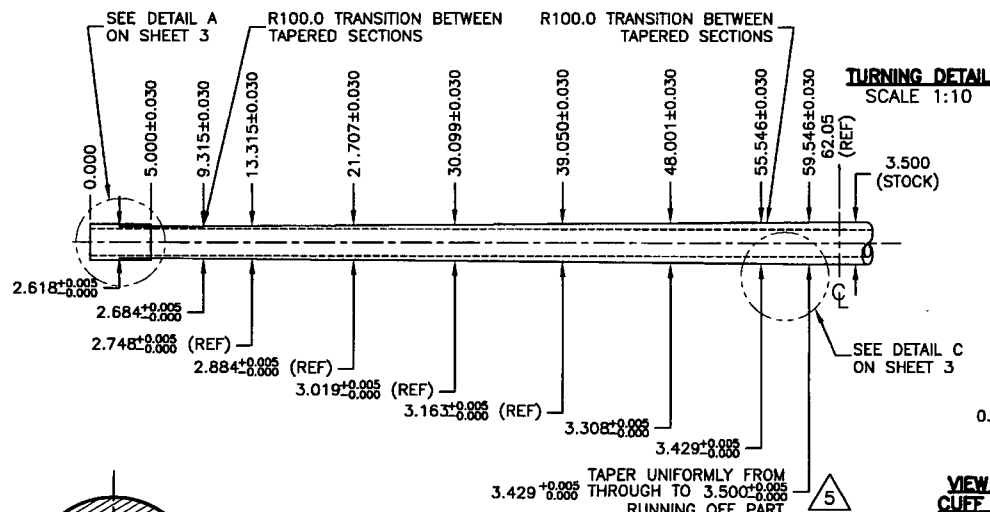
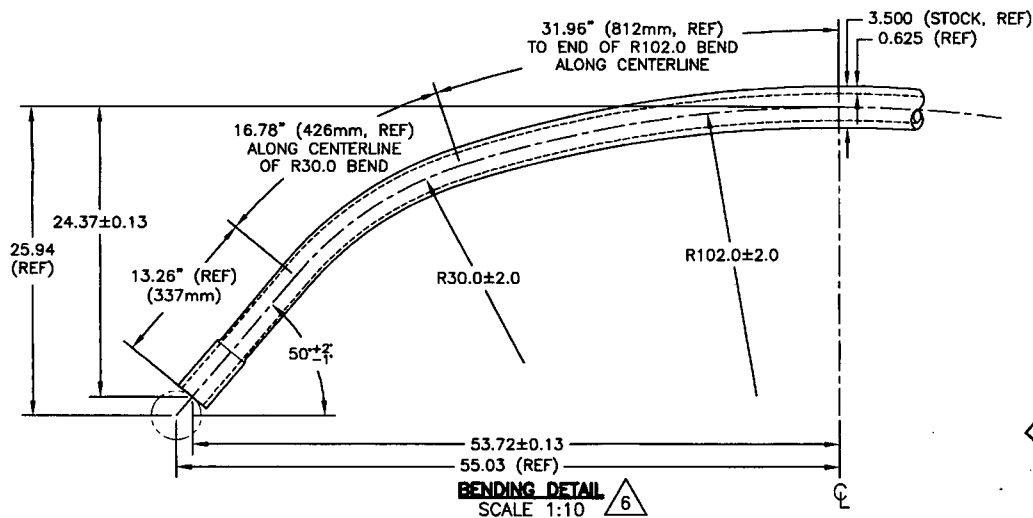
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DESIGN

PH

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PH

CHECKED

PH

APPROVED

PH

DATE

07.03.09

DART

DART AEROSPACE LTD.

DRAWING NO.

D412-664-243

TITLE

CROSSTUBE ASSEMBLY (412 HI AFT)

REV. D

SHEET 2 OF 3

SCALE

1:10

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
45800

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

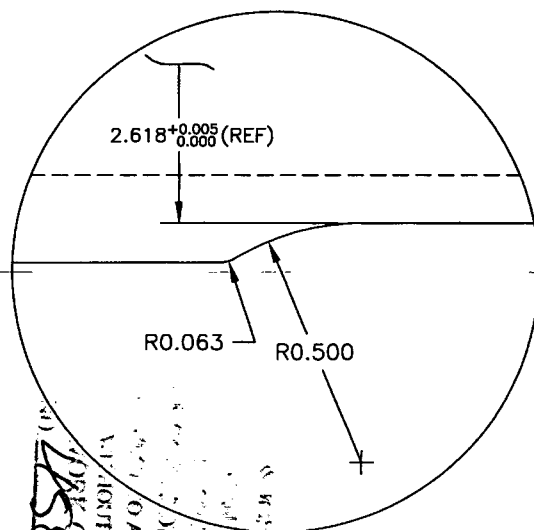
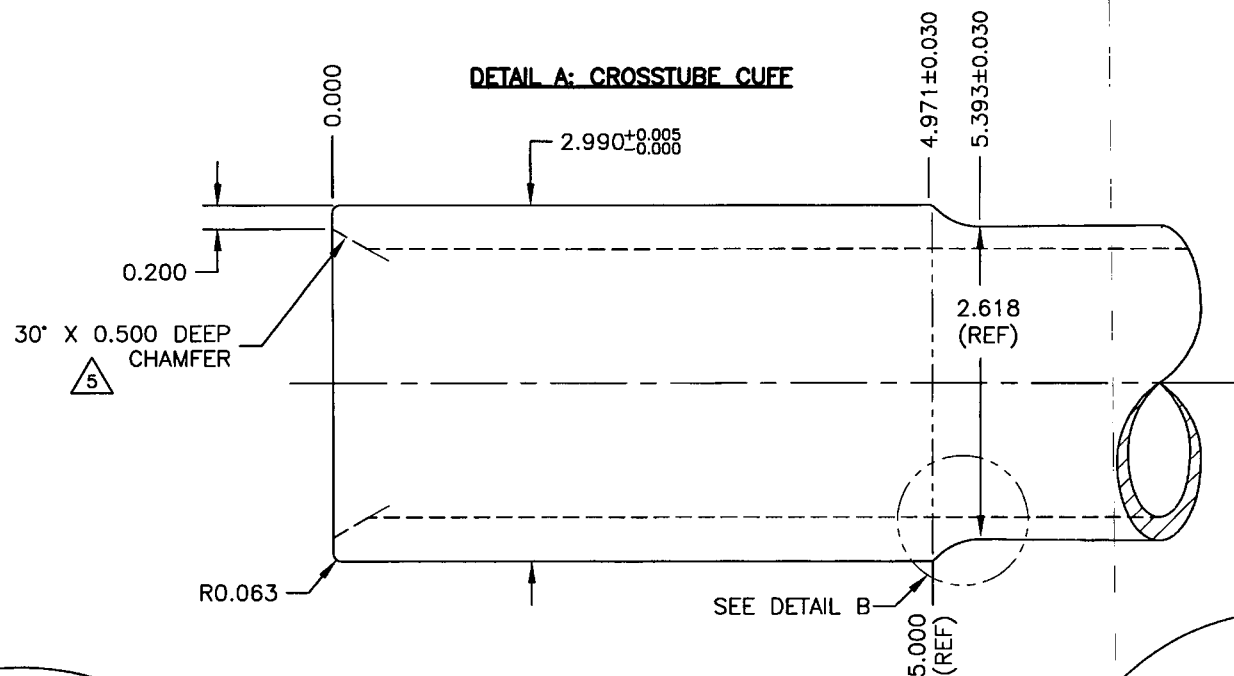
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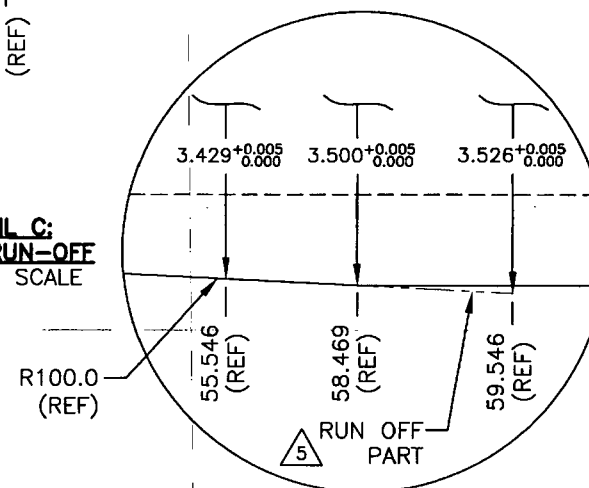
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NOTE: Date & initial all entries

RELEASED
07-04-244P
PER ECN 889



**DETAIL C:
TAPER RUN-OFF**
NOT TO SCALE



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DESIGN	PH	DRAWN BY	PH	DART	DART AEROSPACE LTD. HAMMERSBURY, ONTARIO, CANADA
CHECKED	J	APPROVED	[Signature]	DRAWING NO.	REV. D
DATE	07.03.09	TITLE	CROSSTUBE ASSEMBLY (412 HI AFT)	412-664-243	SHEET 3 OF 3
		SCALE	1:1		

ORDER
NOTICE
COPY
CENT



LIQUID PENETRANT TEST REPORT

P- 14934

PAGE 1 OF 1

CLIENT DART AEROSPACE DATE FEB-24-2009 TIME AM ☒ PM ☐
ATTENTION LINDA / CHARTER ACUREN JOB NO. 188-09-001327
ADDRESS 1270 ABERDEEN ST POWO No. 8259
HANKS BURY ON. WORK LOCATION 540 PF
K64 TK7 ACCEPTANCE STD. ASTM 1417 REV./DATE 2009
PROJECT F.P.I. ON CROSS TUBES
ITEM(S) EXAMINED 4 PCS.

JOB DESCRIPTION PROCEDURE NO. LT-XXXX REV./DATE TECHNIQUE NO. LT-XXXX-XXX REV./DATE
PART NO. MATERIAL ALUMINUM THICKNESS
SCOPE WET FLOUORESCENT LIQUID PENETRANT INSPECTION
CARRIED OUT 100% EXTERNAL.

TEST DETAILS

METHOD ☒ FLUORESCENT ☐ VISIBLE ☒ WATER WASH ☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED
FAMILY BRAND MAGNAFLUX BLACK LIGHT S/N IP65 ☐ OUTPUT > 1000 μ W/cm² ☐ AMBIENT < 2 fc
PENETRANT 2607 MINIMUM DWELL TIME 45 MIN. LIGHTING EQUIP. ☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT > 100 fc @ SURFACE
PENETRANT REMOVER H2O MINIMUM DRY TIME >10 MIN. OTHER LABINO
DEVELOPER SKD 52 MINIMUM DWELL TIME 10 MIN. LIGHT METER S/N CAL DUE DATE FEB 2010
DEVELOPER TYPE ☒ NON AQUEOUS ☐ AQUEOUS ☐ DRY

TEST SURFACE

SURFACE CONDITION ☐ AS GROUND ☐ AS WELDED ☐ MACHINED ☐ SHOT BLASTED ☐ CLEAN BARE METAL
SURFACE TEMPERATURE ☐ < - 4°C/ 20°F ☐ - 4°C/ 20°F TO 10°C/50°F ☐ 10°C/50°F TO 52°C/125°F ☐ > 52°C/125°F

RESULTS- (☐ METRIC ☐ IMPERIAL)

ITEM	COMMENTS	ACCEPT	REJECT
1	45510		
1	45511		
1	45806		
1	45515		
Four CROSS TUBES WERE EXAMINED AND FOUND TO BE ACCEPTABLE.			

Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES

CLIENT REPRESENTATIVE Ian Tittley DTR # 19814
TECHNICIAN (SIGNATURE): Mike Jettus REPORT REVIEWED BY:
NAME (PRINT): Mike Jettus NAME INITIALS
CGSB LEVEL II SNT LEVEL CGSB LEVEL SNT LEVEL
CGSB REG. No 0666 CGSB REG. No

Date: Tuesday, 17/02/2009 10:02:59 AM
 User: Julie Dawson

Process Sheet

Customer : CU-DAR001 Dart Helicopters Services Drawing Name : HIGH AFT X-TUBE 412
 Job Number : 45806
 Estimate Number : 10559
 P.O. Number :
 This Issue : 17/02/2009 S.O. No. :
 Prsht Rev. : NC
 First Issue : 17/02/2009 Type : CROSSTUBES
 Previous Run : 45805
 Written By :
 Checked & Approved By :
 Comment : Est Rev:E 04.02.16 Reformat; Added D3189-1 K/DS
 Est Rev:F 06-03-29 Remove Coments on Pick List JLM
 Est Rev:G 06.12.08 per ECN 886 EC
 Est Rev:H 07-04-30 As per Rev D JLM
 Est Rev:I 08-06-12 add comment in seq. 21 DD verified by:EC

Part Number : D412664203
 Drawing Number : D412-664-243 REV D
 Project Number : N/A
 Drawing Revision : D
 Material :
 Due Date : 10/03/2009 Qty: 1 Um: Each

Additional Product

REFERENCE ONLY

Job Number:



Seq. #: Machine Or Operation: Description :

1.0 DC DOCUMENT CONTROL



JU09.02.27



Comment: DOCUMENT CONTROL

Photocopy bluefile and create labels as per PPP D412-664-203 CHG 006

809/03/05

2.0 PACKAGING 1 PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

3.0 D412664203TRN Crosstube Turning Detail



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

CROSSTUBE TURNING DETAIL

batch_____

Job Completion

